functions as the shield lager and the upper electrode, has been formed, its electrical contact with the second magnetic layer **23** is secured, so that the sense current flows from the first magnetic layer **25** and the second magnetic layer **23**, which functions as both the upper electrode and shield, to the second magnetic layer **14** and the first magnetic layer **12**, which functions as both the lower electrode and shield, through the ferromagnetic tunneling magnetoresistive film **36** in its thickness direction.

It is generally considered that any element designed such that the sense current flows across the thickness of the magnetoresistive film could have a narrower reproducing shield gap than that designed such that the sense current flows along the film surface. However, the ferromagnetic tunneling magnetoresistive film **36** increases in element resistance in inverse proportion to the area of the sensor film. For example, the resistance increases to hundreds to thousands of ohms if the area is 0.25 μm×0.25 μm. On the other hand, the electrode to apply sense current to the ferromagnetic tunneling magnetoresistive film **36** has an area which is larger than the area of the sensor film. In addition, as the reproducing shield gap decreases, so does the thickness of the barrier layer protective insulation film **37**. Consequently, there is a strong possibility that the sense current leaks between electrodes other than those for the ferromagnetic tunneling magnetoresistive film **36**. This problem can be solved by providing the second magnetic layers **14** and **23** (which are composite films of ferromagnetic metal and oxide) and the insulation protective films **15** and **22**. In this way, it is possible to prevent the sense current from expanding in the direction of the film surface (perpendicular to the paper in FIG. **19**), thereby to reduce the effective area of the electrode and to prevent leakage across the electrodes.

Now, the second magnetic layers **14** and **23** (which are composite films of ferromagnetic metal and oxide) are formed from a material having a comparatively high resistivity. The composite film may be used as a part of the electrode if it is not so thick, because it has resistance smaller than that of the ferromagnetic tunneling magnetoresistive film **36**.

The structure shown in FIG. **19** is such that the ferromagnetic tunnel junction magnetoresistive film **36** is arranged at the end of the magnetoresistive sensor and exposes itself to the air bearing surface. The fundamental structure in this example may be modified by adding a yoke to introduce a magnetic flux so that the ferromagnetic tunneling magnetoresistive film **36** does not expose itself to the air bearing surface.

EXAMPLE 14

The magnetic head demonstrated in any of Examples 1 to 13 above is combined with a recording element so as to construct a storage magnetic head which operates in a magnetic storage apparatus capable of recording with a higher density than before. An example of it is schematically shown in FIG. **20**. This magnetic storage apparatus consists of a magnetic recording medium **201** on which information is magnetically recorded, a motor **202** to turn the magnetic recording medium **201**, a magnetic head slider **203** on which the magnetic head of this example is mounted, a suspension **204** to support the magnetic head slider **203**, an actuator **205** to position the magnetic head, and a read-write circuit **206** to process information (recorded and reproduced signals). The magnetic head **203** has a lower shield layer or upper shield layer, to at least either of which is applied the structure with the second magnetic layer **14** or **23** mentioned in the above-foregoing examples. And, the magnetoresistive film **17** is a GMR effect magnetoresistive film or ferromagnetic tunneling magnetoresistive film. In this way, it is possible to provide a magnetic head which has a narrow reproducing shield gap and produces a high output, and thus, it is possible to realize a magnetic storage apparatus capable of high-density recording.

A disk array apparatus can be constructed from several units of the above-mentioned magnetic storage apparatus combined with one another. It will be capable of faster information processing and contribute to higher reliability.

According to the present invention, a magnetic layer in the form of a composite film composed of ferromagnetic metal and oxide is used partly or entirely for at least either of the upper and lower shield layers, and an insulation protective film is arranged between said magnetic layer and the electrode film or longitudinal bias film. This arrangement minimizes the amount of the sense current leaking into the shield layer even though the space of the reproducing shield gap is reduced. The thus produced effect leads to a high-resolution high-output magnetic head suitable for high-density recording. This magnetic head helps realize a magnetic storage apparatus which is capable of high-density recording.

What is claimed is:

1. A magnetic head having a substrate, a pair of shield layers, a magnetoresistive film arranged between said pair of shield layers, a pair of electrodes to apply current to said magnetoresistive film, and a pair of longitudinal bias films, characterized in that an insulation protective film is interposed between either of said pair of electrodes and either of said pair of shield layers, and said either of said pair of shield layers contains at least one magnetic layer having a resistivity which is higher than a resistivity of metal.

2. A magnetic head according to claim **1**; wherein either of said pair of shield layers is composed of a second magnetic layer and a first magnetic layer laminated on top of the other (the former being adjacent to the magnetoresistive film) and said second magnetic layer is a mixture of ferromagnetic metal and oxide, a laminate film of ferromagnetic metal and oxide, or an oxide soft magnetic film.

3. A magnetic head according to claim **2**; wherein a gap layer is interposed between said magnetoresistive film and either of said pair of shield layers.

4. A magnetic head according to claim **1**; wherein either of said pair of shield layers is composed of a second magnetic layer, an insulation layer, and a first magnetic layer laminated one over another (the first being adjacent to the magnetoresistive film) and said second magnetic layer is a mixture of ferromagnetic metal and oxide, a laminate film of ferromagnetic metal and oxide, or an oxide soft magnetic film.

5. A magnetic head according to claim **4**; wherein a gap layer is interposed between said magnetoresistive film and either of said pair of shield layers.

6. A magnetic head according to claim **5**; wherein said insulation protective film is above or under said magnetoresistive film (as viewed from above the substrate) and is arranged in the region excluding said magnetoresistive film, and the boundary between the region in which said insulation protective film is arranged and the region in which said insulation protective film is not arranged is contained in the region in which said pair of shield layers exist.

7. A magnetic head according to claim **4**, wherein part of the insulation layer contained in said lower shield layer or upper shield layer is provided with a contact layer to connect said first magnetic layer with said second magnetic layer.